

**A Second Record of Tarantula Parasitism by  
*Notocyphus dorsalis arizonicus* Townes  
(Hymenoptera: Pompilidae)**

LEE H. SIMONS

Department of Zoology, Arizona State University, Tempe, Arizona 85287.  
Present address: Graduate Group in Ecology, University of California, Davis,  
California 95616.

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*Abstract.*—A second account of parasitism by *Notocyphus dorsalis arizonicus* Townes on *Aphonopelma chalcodes* Chamberlin is described. This pompilid wasp parasitizes juvenile hosts which remain active until near their death. Larval growth is rapid with entire consumption of the host within about 1 mo. *Notocyphus dorsalis arizonicus* larvae can live either internally or externally on hosts, and pupal duration can vary from less than 2 mo to 15 mo. Variable pupal duration may allow wasps to synchronize emergence with optimal seasonal conditions, but position of the larvae (internal versus external), or uncontrolled proximate factors, such as temperature or humidity, may have also caused the divergent reproductive behavior observed in this subspecies.

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*Notocyphus dorsalis arizonicus* Townes is a small (~15 mm total length) pompilid wasp which parasitizes the tarantula *Aphonopelma chalcodes* (Minch, 1979a). Here I provide a second account of this wasp's parasitic behavior including photographs at several stages in larval development. I then compare my observation with Minch's (1979a) original account.

Between 20 and 21 June 1986, I captured a juvenile *Aphonopelma chalcodes* (greatest length from head to abdomen = 18 mm) in a pitfall trap about 30 km east of Phoenix, Arizona. The trap was set in Sonoran Desert habitat at an elevation of 500 m. Although the spider behaved normally, a minute white larva was attached to the right side of the tarantula's dorsum at the thoracic-abdominal junction (Fig. 1A).

The tarantula was housed at Arizona State University in a 10-cm square by 5-cm deep clear plastic box. The box had 1 cm coarse sand on the bottom and several small holes in the lid for ventilation. The tarantula caught and ate several crickets while the larva increased dramatically in size (Table 1, Fig. 1). The larva was not seen to release its hold on the tarantula or reorient its position, nor was the tarantula seen attempting to remove the parasite. The larva seemed strategically placed on the tarantula to avoid being dislodged by the host. The larva pupated on 19–20 July 1986 and emerged as an adult 45–48 days later—on or a few days before 6 September. The adult wasp was identified with Krombein (1979) and by comparison to other pompilids in the Zoology Department's insect collection at Arizona State University. Dr. Mont Cazier confirmed my identification.

My observations match those of Minch (1979a) in several ways. Again the host

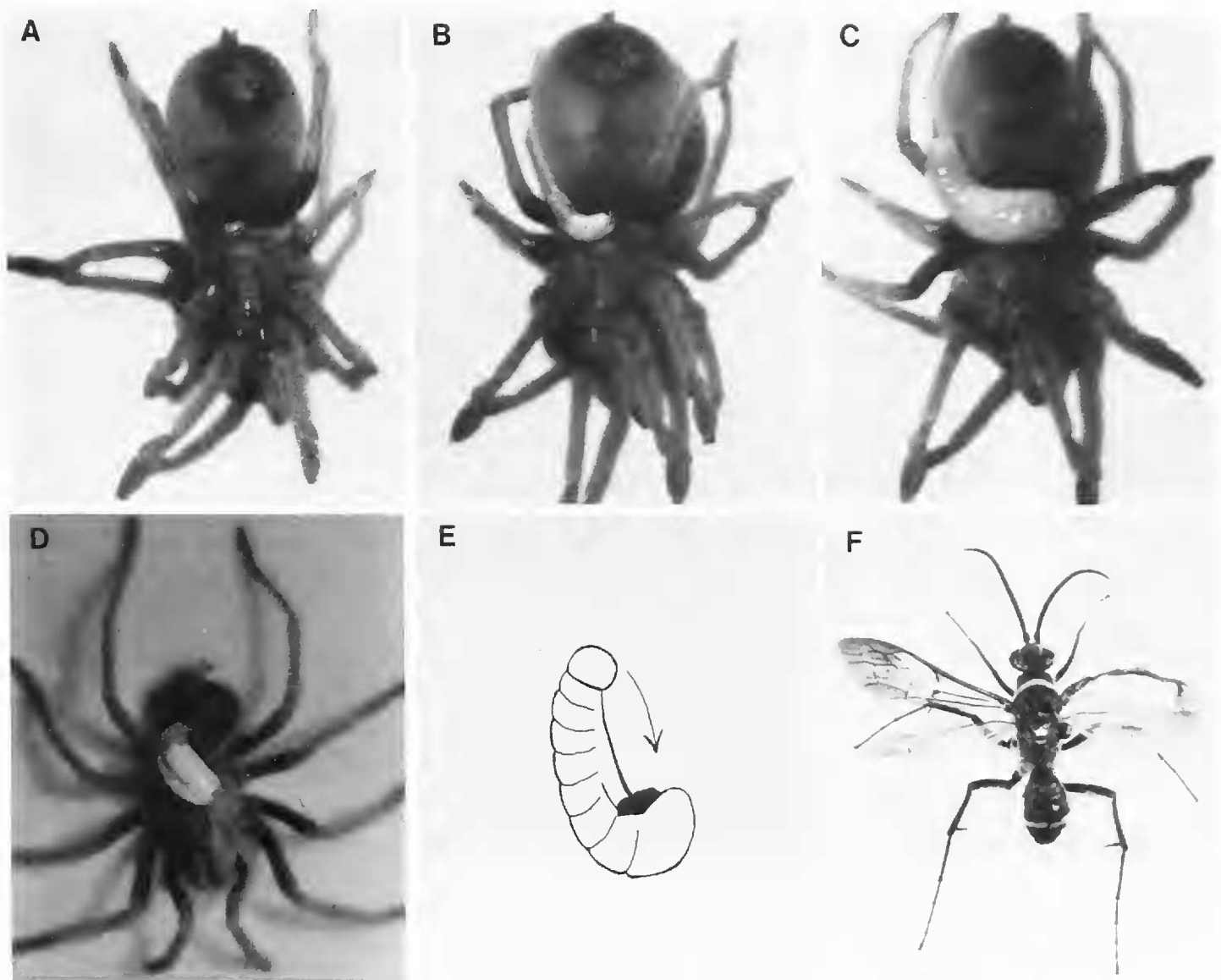


Figure 1. Six stages in the development of *Notocyphus dorsalis arizonicus* Townes on the host *Aphonopelma chalcodes* Chamberlin. The tarantula remained active until the period between photos C and D. Tarantula is alive but flaccid in photo D. The larva continued feeding on amorphous remains of the tarantula in diagram E. The adult wasp emerged 45–48 days after pupating. See Table 1 for a detailed chronology.

was an immature tarantula active away from its burrow (as evidenced by capture in a pit-fall trap). Both hosts remained active and fed on crickets while parasitized. Both larvae grew quickly and completely consumed their hosts (except for fragments) within about 1 mo of capture. Both larvae spun small brown cocoons which they exited through circular openings. Two notable differences were 1) duration of the pupal period: 15 mo in Minch's case but only 48 days in this account, and 2) position of the larva on the host: internal in Minch's case, but external in my observation.

Apparently, *Notocyphus dorsalis arizonicus* larvae can parasitize hosts either internally or externally. Minch fed and handled his tarantula without sign of a parasite until shortly before the larva emerged from inside the host, at or very near the time of the host's death (Minch, pers. comm.). Yet, the larva I observed developed externally (Fig. 1). These contrasting modes of development within the subspecies seem remarkably divergent.

Williams (1928, cited in Minch, 1979a) reported a pupal duration of 52 days for *Notocyphus tyrannicus* Smith in Ecuador, another parasite of theraphosid spiders. Minch (1979a) suggested that the shorter pupal duration of *Notocyphus*

Table 1. Chronology of development of *Notocyphus dorsalis arizonicus* on a juvenile tarantula *Aphonopelma chalcodes*. Larval length refers to greatest rectilinear length, and larval diameter is greatest diameter.

Date	Observation
21 June 1986	Larva is 0.5 mm long.
27 June 1986	Larva is 0.7 mm long. Tarantula ate 2 subadult (10–15 mm) crickets.
1 July 1986	Photograph taken (Fig. 1A). Tarantula active.
3–4 July 1986	Tarantula ate 2 subadult (10–15 mm) crickets. Abdomen bloated to capacity. Tarantula active.
4 July 1986	Larva is 2.2 mm long and 0.8 mm in diameter.
8 July 1986	Photograph taken (Fig. 1B). Tarantula still active.
9 July 1986	Larva is 4.0 mm long and 1.5 mm in diameter.
12 July 1986	Larva is 8.0 mm long and 3.0 mm in diameter.
14 July 1986	Photograph taken (Fig. 1C). Slight deflation of abdomen beginning around site of larval attachment. Larva is 8.5 mm long and 3.2 mm in diameter.
15 July 1986	Photograph taken (Fig. 1D). Tarantula with only partial movement in legs. Abdomen nearly completely deflated.
18 July 1986	Drawing made (Fig. 1E). Tarantula entirely consumed except for some amorphous tissue nestled in larva's ventral posterior half.
19 July 1986	Larva building cocoon. At least some amorphous tissue still attached to larva.
20 July 1986	Larva no longer visible through cocoon wall.
6 Sept. 1986	Adult wasp emerged by cutting a 4.5 mm circular exit hole at one end of the cocoon. Right front wing damaged. Wasp mounted on pin.

*tyrannicus* resulted from the nearly aseasonal climate of the tropics, while a long pupal duration in *Notocyphus dorsalis arizonicus* was an overwintering stage of this temperate wasp. My observation indicates that pupal duration in *Notocyphus dorsalis arizonicus* can actually be quite short.

If larvae are established early enough in the season, *Notocyphus dorsalis arizonicus* can complete development and probably breed in the same year. Tarantulas are most active in the Sonoran Desert in late summer and early fall (Minch, 1979b), so hosts should be abundant for wasps emerging in the fall. Other developmental patterns may occur at other times of the year, so that *Notocyphus dorsalis arizonicus* may be multivoltine. If development varies solely to synchronize with optimal seasonal conditions, however, it is unclear why Minch's larva would then remain encapsulated over the entire period during which my larva transformed.

Minch's wasp was from an elevation about 350 m higher than mine, so elevational differences may have led to the variation reported here. Internal versus external position of the larvae may also influence development by these wasps. Finally, proximate factors such as temperature or humidity may have altered normal development in either of these laboratory observations. Additional study, ideally with controlled experiments, are needed to assess these possibilities.

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## LITERATURE CITED

- Krombein, C. 1979. Catalog of Hymenoptera in America north of Mexico. Smithsonian Institution Press, Washington, D.C.
- Minch, E. W. 1979a. *Notocyphus dorsalis arizonicus* Townes (Hymenoptera: Pompilidae), a new host record of theraphosid spiders. *The Wasmann Journal of Biology*, 37 (1&2):24–26.
- . 1979b. Annual activity patterns in the tarantula, *Aphonopelma chalcodes* Chamberlin. *Novitates Arthropodae*, 1(1):1–34.
- Williams, F. X. 1928. Studies in tropical wasps—their hosts and associates (with descriptions of new species). *Bulletin of the Experiment Station of the Hawaiian Sugar Planters' Association*, 19:1–179.